

ATENT COOPERATION TH





INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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Applicant TS 074	_	ent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
Internatio	nal app	lication No.	International filing date (day/monti	h/year) Priority date (day/month/year)
PCT/EF	99/10)447	22/12/1999	29/12/1998
Internatio B01J8/0		ent Classification (IPC) or na	tional classification and IPC	
Applicant		RNATIONALE RESEA	RCH MAATSCHAPPIJet al	
1. This	intern is tran	ational preliminary exam smitted to the applicant a	ination report has been prepare according to Article 36.	d by this International Preliminary Examining Authority
2. This	REPO	ORT consists of a total of	5 sheets, including this cover s	sheet.
	been a	amended and are the bas	d by ANNEXES, i.e. sheets of the sis for this report and/or sheets of the Administrative Instruct	he description, claims and/or drawings which have containing rectifications made before this Authority ions under the PCT).
The	`	exes consist of a total of		
			ating to the following items:	
		Basis of the report	1	
1	_	•	eninion with regard to nevelty in	eventive step and industrial applicability
II I∨	_			iventive step and industrial applications
, 10 V	_	Reasoned statement u		o novelty, inventive step or industrial applicability;
v		Certain documents cit	ed	
VI		Certain defects in the in	nternational application	
VII		Certain observations o	n the international application	. :
Date of s	ubmissi	on of the demand	Date of	f completion of this report
08/06/2	000		22.03.2	2001
		g address of the international	al Authori	ized officer
9	D-8	opean Patent Office 0298 Munich +49 89 2399 - 0 Tx: 52365	Buesi	ing, G
	_	: +49 89 2399 - 4465	·	one No. +49 89 2399 8356

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/10447

I. Basis	f the	report
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۱.	resp the	oonse to an invitation	Irawn on the basis of (substitute sheets which have been furnished to the receiving Office to on under Article 14 are referred to in this report as "originally filed" and are not annexed to so not contain amendments (Rules 70.16 and 70.17).):
	1-15	5	as originally filed
	Clai	ims, No.:	
	1-15	5	as originally filed
	Dra	wings, sheets:	
	1/6-	6/6	as originally filed
2.	With lang	n regard to the lan q guage in which the	guage, all the elements marked above were available or furnished to this Authority in the international application was filed, unless otherwise indicated under this item.
	The	se elements were	available or furnished to this Authority in the following language: , which is:
		the language of a	translation furnished for the purposes of the international search (under Rule 23.1(b)).
		the language of p	ublication of the international application (under Rule 48.3(b)).
		the language of a 55.2 and/or 55.3).	translation furnished for the purposes of international preliminary examination (under Rule
3.			cleotide and/or amino acid sequence disclosed in the international application, the ry examination was carried out on the basis of the sequence listing:
		contained in the ir	nternational application in written form.
		filed together with	the international application in computer readable form.
		furnished subsequ	uently to this Authority in written form.
		furnished subsequ	uently to this Authority in computer readable form.
			at the subsequently furnished written sequence listing does not go beyond the disclosure in application as filed has been furnished.
		The statement that listing has been for	at the information recorded in computer readable form is identical to the written sequence urnished.
4.	The	amendments have	e resulted in the cancellation of:
		the description,	pages:
		the claims,	Nos.:

International application No. PCT/EP99/10447

		the drawings,	sheets:			
5.					ome of) the amendments had not been made, since they have as filed (Rule 70.2(c)):	beer
		(Any replacement shoreport.)	eet contair	ning such	amendments must be referred to under item 1 and annexed to	this
6.	Add	litional observations, if	f necessar	y:		
۷.		asoned statement un tions and explanatio			ith regard to novelty, inventive step or industrial applicabil	ity;
1.	Sta	tement				
	Nov	velty (N)	Yes: No:	Claims Claims	1 - 15	
	Inve	entive step (IS)	Yes: No:	Claims Claims	1 - 15	

Claims 1 - 15

Claims

Yes:

No:

2. Citations and explanations see separate sheet

Industrial applicability (IA)



INTERNATIONAL PRELIMINARY Inter EXAMINATION REPORT - SEPARATE SHEET

S cti n V:

1. Reference is made to the following documents:

D1: DE-U-92 02 798 D2: GB-A-2 303 860 D3: DE-A-42 22 162

2. The catalytic reactor according to claim 1 comprises means for variably covering part of the upstream surface of the catalyst bed. Similar reactors are known from D1, D2 or D3. The claimed reactor is different from the prior art reactors in that the feed supply chamber has, during normal operation, no zones where the fluid flow is stagnant. This functional feature thus provides novelty of the claimed reactor.

The functional feature is considered admissible because the ordinarily skilled worker in the art of reactor engineering knows whether the fluid flow in a reactor would be stagnant or not during normal operation by applying for example common rules of fluid dynamics. In view of the various embodiments of the invention disclosed in the application he is also taught how to design the reactor such that the functional feature is actually obtained.

3. Starting from any of D1, D2 or D3, the problem to be solved by the invention was how to provide for a reactor wherein the upstream surface of the catalyst can be covered as a function of reactant fluid throughput whilst avoiding uncontrolled gasphase reactions upstream of the catalyst, such as explosion, ignition and flashback of flames.

The problem is solved by designing the reactor such that, during normal operation, stagnant zones do not occur upstream of the catalyst. This is, for example, achieved by the various embodiments disclosed in the drawings.

The skilled person, seeking to solve the above problem will not find any teaching or suggestions in the cited prior art which would guide him to the invention.

Independent claims 13 and 15 and the dependent claims are all based on the 4. same inventive concept. Novelty and inventive step can therefore be acknowledged for all claims on file.

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PATENT COOPERATION TREAT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

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Applicant TS 074	's or agent's file reference	FOR FURTHER ACTION		Transmittal of Intern 20) as well as, where		
	nal application No.	International filing date (da	v/month/vear)	(Earliest) Priority D	ate (day/mon	th/year)
	P 99/ 10447	22/12/19		, ,	12/1998	
		221211		27	12/1//0	
Applicant SHELL	INTERNATIONALE RESE	ARCH MAATSCHAPPI	Jet al			
This into	ernational Search Report has been ng to Article 18. A copy is being to	n prepared by this internation ansmitted to the internationa	nal Searching Authors I Bureau.	ority and is transmitte	ed to the appl	icant
	ernational Search Report consists It is also accompanied by	of a total of3 a copy of each prior art doc	sheets. ument cited in this i	report.	4	
1. Bas	is of the report					
a.	With regard to the language, the language in which it was filed, un	international search was car ess otherwise indicated und	Tled out on the bas er this item.	ls of the international	application in	the
11	the International search w Authority (Rule 23.1(b)).	as carried out on the basis o	of a translation of th	e International applic	ation fumishe	ed to this
b.	With regard to any nuclectide an was carried out on the basis of th	d/or amino acid sequence sequence is sequence listing:	disclosed in the int	ernational application	n, the internat	ional search
	contained in the internation	onal application in written for	m.			
1	flied together with the inte	mational application in com	puter readable form	1.		
	fumished subsequently to	this Authority in written form	n.			•
		this Authority in computer r	•			
	the statement that the sul	osequently furnished written is filed has been furnished.		es not go beyond the	disclosure in	n the
		ormation recorded in compu	ter readable form Is	identical to the writte	n sequence li	Isting has been
2.	Certain claims were fou	nd unsearchable (See Box	I).			·
3.	Unity of invention is lac	king (see Box II).				
4. Witi	h regard to the title,					
	the text is approved as su	ibmitted by the applicant.				
	=	shed by this Authority to read	l as follows:			
CA	TALITIC REACTOR					
5. Witt	h regard to the abstract,		•			
	X the text is approved as su	ibmitted by the applicant.				
ļ	the text has been establis	shed, according to Rul 38.2 a data of mailing of this inter				
6. The	figure of the drawings to be pub		gure No.	<u>5a</u>		-
	as suggested by the appl	Icant.			None of th	figures.
	because the applicant fall	led to suggest a figure.				
	because this figure better	characterizes the invention	•			

International Application No CT/EP 99/10447 A. CLASSIFICATION OF SUBJECT IPC 7 B01J8/00 ATER B01J8/02 According to international Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) BO1J FO2M HO1M CO1B Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practical, search terms used) C. DOCUMENTS CONSIDERED TO BE RELEVANT Relevant to claim No. Citation of document, with indication, where appropriate, of the relevant passages Category ° DE 92 02 798 U (EMITEC GESELLSCHAFT FÜR 1,2,4-6, X 8,12-15 EMISSIONSTECHNOLOGIE MBH) 23 April 1992 (1992-04-23) figure 6 page 13, line 25 -page 14, line 2 page 8, paragraph 30 -page 9, line 22 page 6, line 25 -page 7, line 12 page 3, line 35 -page 4, line 17 page 1, line 5 - line 28 X GB 2 303 860 A (DAIMLER-BENZ AG) 1,2,4,8, 5 March 1997 (1997-03-05) 10,11, 13,15 figures 3-5 page 12, paragraph 2 -page 13, paragraph 1 page 10, paragraph 3 -page 11, paragraph 1 page 6, paragraph 1 -page 7, paragraph 1 -/--Y Patent family members are listed in annex. Y Further documents are listed in the continuation of box C.

<u> </u>	
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filling date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filling date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family
Date of the actual completion of the international search	Date of mailing of the International search report
4 April 2000	13/04/2000
Name and mailing address of the ISA	Authorized officer

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European Patent Office, P.B. 5818 Patentiaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo ni, Fax: (+31–70) 340–3016

Stevnsborg, N

International Application No CT/EP 99/10447

		C1/E1 93/1044/	
	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	Relevant to claim No.	
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Holovali to dain No.	
Х	DE 42 22 162 A (KLAUS JÜRGEN NORD) 14 January 1993 (1993-01-14) abstract column 1, paragraph 1 column 2, line 68 -column 4, line 1 column 5, line 11 -column 6, line 30 figures	1,2,4,6, 8,13,15	
A		10	
A	US 4 134 425 A (HORST GÜSSEFELD & HEINZ CHRISTOPH) 16 January 1979 (1979-01-16) column 2, line 30 -column 3, line 44 column 3, line 58 -column 5, line 27 figures 1,2	1,2,4-7, 10,13,14	
A	PATENT ABSTRACTS OF JAPAN vol. 11, no. 297 (C-448), 25 September 1987 (1987-09-25) -& JP 62 087401 A (FUJI ELECTRIC CO LTD.), 21 April 1987 (1987-04-21) abstract; figures	1	
A	DE 11 38 290 B (BADISCHE ANILIN- & SODA-FABRIK AKTIENGESELLSCHAFT) the whole document	. 1	
A	GB 1 367 941 A (SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ N.V.) 25 September 1974 (1974-09-25)	. *	
A	US 5 776 421 A (MITSUIE MATSUMURA & TOSIO SHINOKI) 7 July 1998 (1998-07-07) abstract; figures 1A,1B		

1,

rmation on patent family members

International Application No CT/EP 99/10447

	itent document I in search report		Publication date	Patent family member(s)	Publication date
DE	9202798	U	23-04-1992	NONE	
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				FR 2736907 A	24-01-1997
				IT RM960425 A	15-12-1997
				US 5772707 A	30-06-1998
				US 5989503 A	23-11-1999
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				FR 2111485 A	02-06-1972
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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A1
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(71) Applicant (for all designated States except US): SHELL INTERNATIONALE RESEARCH AND AND 2596 HB The

29 December 1998 (29.12.98)

(71) Applicant (for all designated States except US): SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V. [NL/NL]; Carel van Bylandtlaan 30, NL-2596 HR The Hague (NL).

(72) Inventors; and
(75) Inventors/Applicants (for US only): WENTINCK, Hendrik, Martinus [NL/NL]; Badhuisweg 3, NL-Amsterdam 1031 (NL) SMIT, Jacobus, Antonius, Jozef [NL/NL]; Badhuisweg 3, NL-1031 CM Amsterdam (NL).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

With international search report.

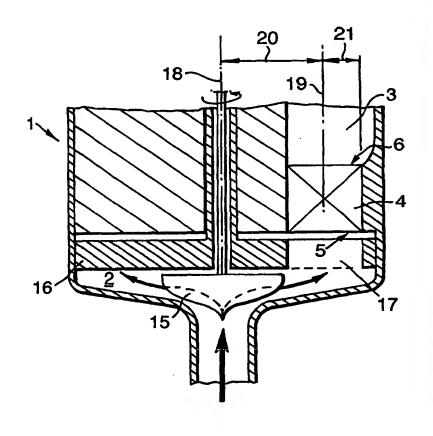
(54) Title: CATALYTIC REACTOR

(57) Abstract

(30) Priority Data:

98310768.1

The invention relates to a reactor (1), suitable for the catalytic conversion of a feed mixture which is capable of explosion and/or ignition, comprising a feed supply chamber (2), an effluent discharge chamber (3), a catalyst bed (4) having an upstream surface (5) and a downstream surface (6) which is in fluid communication with the effluent discharge chamber (3), and means for covering part of the upstream surface (5) that partly confine the feed supply chamber (2), wherein the feed supply chamber (2) has, during normal operation, no zones where the fluid flow is stagnant, to the use of such a reactor (1), in particular a catalytic partial oxidation process, and to transport means provided with such a reactor (1).



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A. CLASSIFICATION OF SUBJECT MATTER IPC 7 B01J8/00 B01J8/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols) IPC 7 B01J F02M H01M C01B

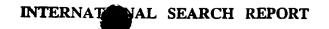
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUM	ENTS CONSIDERED TO BE RELEVANT	
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to dalm No.
X	DE 92 02 798 U (EMITEC GESELLSCHAFT FÜR EMISSIONSTECHNOLOGIE MBH) 23 April 1992 (1992-04-23) figure 6 page 13, line 25 -page 14, line 2 page 8, paragraph 30 -page 9, line 22 page 6, line 25 -page 7, line 12 page 3, line 35 -page 4, line 17 page 1, line 5 - line 28	1,2,4-6, 8,12-15
X	GB 2 303 860 A (DAIMLER-BENZ AG) 5 March 1997 (1997-03-05) figures 3-5 page 12, paragraph 2 -page 13, paragraph 1 page 10, paragraph 3 -page 11, paragraph 1 page 6, paragraph 1 -page 7, paragraph 1 -/	1,2,4,8, 10,11, 13,15

Further documents are listed in the continuation of box C.	Patent family members are listed in annex.
Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(e) or which is cited to establish the publication date of another chation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention when the considered novel or cannot be considered to the twolve an inventive step when the document is taken alone document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is taken alone document to particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such document is combined with one or more other such document in the art. "&" document member of the same patent family
Date of the actual completion of the international search	Date of mailing of the international search report
4 April 2000	13/04/2000
Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5816 Patentiaan 2 NL – 2280 HV Rijewljk Tel. (+31–70) 340–2040, Tx. 31 651 epo ni, Fax: (+31–70) 340–3016	Stevnsborg, N

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In Application No
PCT/EP 99/10447

		PC1/EP 99/1044/
C.(Continu	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 42 22 162 A (KLAUS JÜRGEN NORD) 14 January 1993 (1993-01-14) abstract column 1, paragraph 1 column 2, line 68 -column 4, line 1 column 5, line 11 -column 6, line 30	1,2,4,6, 8,13,15
A	figures	10
A	US 4 134 425 A (HORST GÜSSEFELD & HEINZ CHRISTOPH) 16 January 1979 (1979-01-16) column 2, line 30 -column 3, line 44 column 3, line 58 -column 5, line 27 figures 1,2	1,2,4-7, 10,13,14
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A	DE 11 38 290 B (BADISCHE ANILIN- & SODA-FABRIK AKTIENGESELLSCHAFT) the whole document	1
A	GB 1 367 941 A (SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ N.V.) 25 September 1974 (1974-09-25)	
A	US 5 776 421 A (MITSUIE MATSUMURA & TOSIO SHINOKI) 7 July 1998 (1998-07-07) abstract; figures 1A,1B	

1



tri	onal Application No	
PCT/	EP	99/10447

	atent document i in search report		Publication date	Patent family member(s)	Publication date
DE	9202798	U	23-04-1992	NONE	
GB 2303860	2303860	Α	05-03-1997	DE 19526886 C	12-09-1996
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				CA 1091543 A	16-12-1980
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				BE 773741 A	11-04-1972
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